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MEMORANDUM FOR PR (Contractor/In-House Publication)

FROM: PROI (TI) (STINFO)

18 Apr 2000

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-AB-2000-076**
 Christe, K.O., Wilson, W.W., Vij, A., Vij, V., Sheehy, J.A., Boatz, J.A., and Tham, F., "Use of Fluorine Chemistry for the Synthesis of Polynitrogen Compounds" (Abstract)

16th International Symposium of Fluorine Chemistry
(Durham, UK, 23 Jul 00) (Submission Deadline: 18 Apr 2000)

(Statement A)

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 PHILIP A. KESSEL Date
 Technical Advisor
 Propulsion Science and Advanced Concepts Division

USE OF FLUORINE CHEMISTRY FOR THE SYNTHESIS OF POLYNITROGEN COMPOUNDS

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Fluorine chemistry plays an important role in the synthesis of novel polynitrogen compounds. Thus, the reaction of $\text{N}_2\text{F}^+\text{AsF}_6^-$ with HN_3 in anhydrous HF solution has been shown to yield $\text{N}_5^+\text{AsF}_6^-$, a white solid that is marginally stable at room temperature and represents the first new stable homoleptic polynitrogen species in more than 100 years. We have now succeeded to prepare the $\text{N}_5^+\text{SbF}_6^-$ salt in high purity and yield and to record its complete vibrational spectrum. The compound is surprisingly stable, up to 70 °C, and exhibits little shock sensitivity. During attempts to recrystallize the compound from $\text{SO}_2/\text{SO}_2\text{ClF}$ solutions, another new N_5^+ salt, $\text{N}_5^+\text{Sb}_2\text{F}_{11}^-$, was obtained and its crystal structure was determined. The V-shaped configuration and the bond lengths and angles, predicted for N_5^+ by our previous theoretical calculations, were confirmed. The reaction chemistry of N_2F^+ salts with other hydrogen containing species will be briefly discussed.